MICROSCOPIC CHARACTERISTICS OF EMU (*DROMAIUS NOVAEHOLLANDIAE*) SEMEN COLLECTED BY NON-TEASER METHOD IN HUMID TROPICAL CLIMATE

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ABSTRACT

A study was conducted for collection and evaluation of Emu bird semen by non teaser method. The raw semen collected from individual Emu birds was evaluated for microscopical seminal attributes. Highly significant ($P<0.001$) results were obtained and the overall mean values for mass activity, per cent motility, concentration, per cent live and abnormal spermatozoa of individual male was 3.36 ± 0.08, 74.39±0.99, 2.19±0.05 $x10^9$per ml, 87.40±0.67 % and 9.15 ± 0.33 % respectively. The individual males showed varied response and significant difference in seminal attributes. Creamy white thick consistency semen had significant ($P\leq0.01$) seminal attributes than yellow and watery semen.

KEY WORDS : Emu, Semen, Evaluation, Non Teaser method

INTRODUCTION

Emu (*Dromaius novaehollandiae)* is a flightless, monogamous bird and is the second largest bird belonging to ratite family. Emu farming is gaining popularity in many parts of India for its skin, fat, feathers, meat and eggs and to produce valuable products such as leather and oil. This species is well-suited for intensive rearing, adapts relatively easily to cold and hot environments, and has a high rate of reproduction (Malecki *et al.*, 2002; Sales, 2007). In natural mating, Emu farmer has to keep equal number of breeder male and female, maintain surplus breeder males to achieve optimum fertility level, thus rise in cost of production. Male Emu birds that are not otherwise productive, will consume more feed, which increase cost of production per chick. The monogamous innate behaviour of Emu is a major constraint for their genetic improvement. Apart from that, Emu breeder birds are not easy to transport for natural mating to other farms resulting in inbreeding and hence, the germ plasm of superior birds cannot be disseminated. The alternate choice is Artificial Insemination, for that a successful method of collection and evaluation is must. Hence, this study was conducted to collect the semen in Emu bird by non-teaser method and evaluate the microscopic semen characteristics.

MATERIALS AND METHODS

Selection and training of male Emu birds

Ten adult male Emu birds aged 3 to 4 years were selected and housed individually in a 10' x 50' pen constructed in parallel rows at Emu unit, University Research Farm, TANUVAS, Chennai, Tamilnadu, India. The male birds were selected based on the basis of readiness in accepting human beings without fear. All the birds were housed properly under standard managemental condition. Standard Emu breeder ration containing 18.0 per cent crude protein, 2600 Kilo calories of Metabolizable energey, 3.5 per cent calcium, 0.45 per cent phosphorus, 0.96 per cent lysine and 0.49 per cent methionine at the rate of one kg/day/bird and portable drinking water was made available *ad libitum.*

The selected male Emu birds were trained for semen collection by non-teaser method . As Emu breeds between September to March months in tropical climate, all the male birds were trained for collection of semen artificially, using artificial cloaca during early morning and late evening hours daily in the absence of female Emu birds. The artificial cloaca (AC) as described by Malecki *et al.* (1997) was used with slight modifications. The artificial cloaca was made of thick rubber hose of 15 cm long and 5 cm diameter. A thin rubber liner of 9 inche long was fitted inside the rubber hose. The space between the hose and liner was filled with warm water (42-45ºC). A collection cup was placed near one end of the rubber hose to collect the ejaculated semen**.**

Evaluation of semen

Immediately after collection, the semen was kept in a water bath at $20^{0}C$. It was evaluated for its microscopical seminal attributes viz. mass activity, per cent motility, concentration, per cent live and abnormal spermatozoa. The mass activity was evaluated by placing a drop of freshly ejaculated semen on a clean grease free glass slide and examined under low power objective of microscope, without placing a cover slip and activity was ranked on a 0 to 5 scale (Allan and Champion, 1955). The motility of spermatozoa was assessed by placing a small drop of raw semen in the middle of the grease free slide, then covered with a cover slip and examined under high power objective of microscope. The motility was assessed and expressed as percentage as described by Parker *et al*. (1942).

The concentration of spermatozoa in fresh undiluted semen was determined by using a "NEUBAUER" type hemocytometer and the final concentration of spermatozoa expressed as $\times 10^{9}$ per ml according to the procedure of Allen and Champion (1955).

The viability of semen is one of the most important aspect of semen quality which determines fertilizing ability and survival of embryo to hatching (Cooper and Rowell, 1958). The viability of spermatozoa was determined by Eosin-Nigrosin staining procedure as described by Bakst and Cecil (1997). Smears were prepared carefully, stained and a maximum of 200 spermatozoa were counted for the observation. The abnormal spermatozoa was determined by rose bengal staining method. All the data recorded in this study were analysed as per Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

Microscopic seminal attributes of Emu bird is presented in Table 1. Highly significant (($P \leq 0.01$)) variation between birds was observed in all seminal attributes. The mass activity values varied with individual male birds. The watery ejaculate of Emu semen showed less mass activity and motility compared to thick consistency semen which concurs with the view of Walsangkar (2010) who recorded poor seminal attributes in watery and thin quality of ostrich semen.

The concentration of spermatozoa coincided with the other semen attributes especially the semen consistency in elite males. In spite of one male yielded yellowish white semen, its concentration was comparable with other elite males. However, watery semen had recorded significantly less concentration which is in agreement with the view of Walsangkar (2010).

The per cent live spermatozoa observed in this study was highly significantly (($P \leq 0.01$)) different individually and similar to the earlier observations recorded by Malecki *et al.* (1997) and Navnath (2012) in Emu. The live spermatozoa count was higher in creamy white and thick consistency sample, and even in thin white semen. But, in yellowish white thick semen, livability was lesser which may be due to cloacal contaminants and not suited for further processing and fertility studies.

The per cent abnormal spermatozoa also noticed highly significant (($P \leq 0.01$)) results in this study between individual males, which was lower than the earlier findings of Plessis and soley (2010) and Navnath (2012) in Emu. However, Malecki and Martin (2000) have observed lower per cent abnormal spermatozoa in Emu than this study.

T**able: 1 Microscopic semen characteristic of selected individual Emu birds** (Mean ± SE)

Bird No.	Mass activity** (0-5)	Motility ** %	Conc.× 10^9 / ml **	Live spermatozoa ** %	Abnormal spermatozoa** %
E 1 (n=29)	3.00 ^{d} ±0.14	77.04 ^{c} ±1.76	1.79 ^{d} ±0.009	89.9^{abc} ±1.16	7.27^{b} ±0.55
E 2 (n=31)	2.30^{ef} ±0.12	65.00^{e} ±1.82	1.67 ^{def} ±0.004	85.2 ^{de} ±1.73	9.31^{c} ±0.41
E 5 (n=28)	1.86 ^{g} ±0.13	60.36^{efg} ±1.74	2.96^{ab} ±0.021	77.8^{f} ±1.09	13.05^{de} ±0.82
E 6 (n=16)	2.33 ^{e} ±0.17	63.33^{ef} ±2.89	1.59^{def} ±0.007	71.5 ^{g} ±2.75	16.48^{f} ±1.31
E 7 (n=25)	3.75^{bc} ±0.10	77.50^{cd} ±0.99	1.72^{de} ±0.004	87.8^{cd} ±0.78	12.66^{d} ±0.80
E 8 (n=52)	4.50 ^{a} ±0.08	86.35^{a} ±0.67	3.27 ^{a} ±0.013	93.2 ^{a} ±0.52	6.07^{a} ±0.43
E 9 (n=39)	4.05^{b} ±0.12	85.38^{ab} ±0.81	2.59^{bc} ±0.001	91.7^{ab} ±0.51	8.18^{bc} ±0.65
Over all mean	**3.36 ±0.08**	**74.39 ±0.99**	**2.19 ±0.0.05**	**87.40 ±0.51**	**9.15 ±0.33**

Means bearing different superscripts within columns differ significantly, ** Highly significant (P<0.01). n = no. of observations

Conclusion

From the above study, It is revealed that, the best male Emu can be selected based on results obtained by microscopical evaluation of semen. Selecting elite male in correct time will confirm better dissemination of their germplasm through artificial insemination as reiterated by Malecki and Martin (2000), which gain more significance in monogamus birds like Emu. This study will facilitate for further processing of Emu semen based on microscopic semen evaluation of Emu bird.

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